

Abstract Title Page
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Title: The Challenge of Senior Year in Chicago Public Schools: A Mixed-Methods study of Coursetaking and its Effects on College Outcomes

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Abstract Body

Limit 4 pages single-spaced.

Background / Context:

Description of prior research and its intellectual context.

U.S. Education Secretary Arne Duncan argued in a 2010 address to the College Board, “High schools must shift from being last stop destinations for students on their education journey to being launching pads for further growth and lifelong learning for all students. The mission of high schools can no longer be to simply get students to graduate. Their expanded mission... must also be to ready students for careers and college.” What will it take to meet this challenge? Senior year in the Chicago Public Schools (CPS) presents an interesting dilemma in this changing educational landscape. While all CPS graduates take what might be termed a college preparatory curriculum in order to fulfill graduation requirements, those requirements can largely be fulfilled by junior year. This leaves senior year as the only year in high school with little guidance about what courses students should take - and also leaves space for a great deal of variation in students’ enrollment in advanced coursework like a fourth year of math or an AP course. These senior year coursework decisions could be critical for college access and success. Advanced coursework may be critical in boosting students’ academic skills for college, and it could also be the case that not taking advanced coursework may make college-bound students less desirable applicants in an increasingly competitive college admissions pool. Senior year may be a critical lever in addressing college readiness and performance, and we must build an understanding of what matters for which students in shaping postsecondary outcomes

There is already a moderate body of research on this topic that addresses various aspects of these questions. There are a number of studies that support the hypothesis that AP courses are able to increase student access to college (Roderick and Stoker 2010, Jackson 2007, Long and Conger 2012). Other studies with rigorous methods find that students who take higher level math courses are less likely to be placed in remedial education, are more likely to receive higher grades in college and are more likely to persist and graduate (Joensen & Neilsen 2009, Rose and Betts 2004). Finally, the well known *Answers in the Toolbox* (Adelman 1999) established a link between the rigor of student’s coursework, high school GPA, and test scores and the likelihood of college graduation. While all these studies have focused on the relationship between high school courses and later educational outcomes, they do not focus specifically on senior year.

Purpose / Objective / Research Question / Focus of Study:

Description of the focus of the research.

This study has taken an in-depth look at senior year coursetaking patterns in CPS. Using both quantitative and qualitative methods we examine both the effects senior year coursetaking has on college outcomes and student reports of their experiences in senior year. Specifically, we quantitatively ask what effect AP courses, a fourth year of math, or a high concentration of core subjects in a student’s senior year schedule can have on enrolling in a four-year college, enrolling in a more selective four-year college, and persisting in a four year college for two years. Qualitatively, we examine the level of challenge reported by students in individual classes as well as across senior year as a whole. All of our analysis is run across separate

achievement subgroups in order to observe any heterogeneity of treatment effects based on student achievement.

Setting:

Description of the research location.

This study focuses exclusively on CPS seniors. CPS is the third largest school system in the country, with 122 high schools, and approximately 400,000 students. In Chicago, Illinois, and across most of the nation, high school curricula and course offerings have shifted over the past twenty years to align with college readiness standards. Chicago has seen a massive expansion of AP courses offered, along with a change in graduation requirements to align with what colleges broadly say is required to gain admittance, effectively driving an increase in core coursetaking over time but leaving little guidance for senior year.

Population / Participants / Subjects:

Description of the participants in the study: who, how many, key features, or characteristics.

The quantitative portion of this study focused on 30,649 CPS graduates from the graduating cohorts of 2003-2007. These were students who had access to either a somewhat selective or selective college based on their ACT scores and cumulative GPAs. Students with higher or lower achievement did not exhibit enough variation in coursetaking patterns to reliably estimate an impact. Of these graduates, 15% were white, 41% were African American, 35% were Latino and 8% were Asian; 64% of these graduates were female. Approximately half of these students took an advanced math course (Pre-Calculus, Calculus, AP Statistics or Computer Programming), 37% of students took at least one AP course, and 63 % took at least four core academic subjects their senior year. The qualitative portion of this study focuses on 93 students from the graduating class of 2006. The sample is gender-balanced and reflects the racial/ethnic composition of CPS students across the city.

Intervention / Program / Practice:

Description of the intervention, program, or practice, including details of administration and duration.

We were able to identify, from the literature, three key indicators of a strong senior year schedule: four or more core academic subject classes, a fourth year of math, or at least one AP course. Participation in these courses is stratified by achievement across the district, but more importantly, it is also stratified within achievement categories across high schools. For example, students with access to a somewhat selective college (i.e. those with grades and ACT scores that would likely give them access to most public colleges in Illinois) participate in fourth-year math at rates as low as 20 percent and as high as 90 percent across high schools (See Figure 1). This variation within achievement groups exists for participation in AP and four or more core classes as well.

Research Design:

Description of the research design.

In any investigation involving student choice, self selection is a major source of bias. We use a combination of propensity scores and instrumental variables to address the selection problem. First, we separately model the propensity of each indicator in schools where many students took these courses. Then using this model, we simulate the propensity for taking these

courses in schools where few students take these courses because of administrative decisions about course offerings. A key condition for instrumental variables to be valid is that differences in exposure to these courses are only related to the outcomes of interest through the treatment rather than exogenous factors like student motivation. This condition would be violated if students who attended schools that offer high rates of fourth year math or AP classes differ systematically from schools that have fewer students taking these classes. However, we find that there is significant overlap in respect to school-wide GPAs and ACT scores, and we account for further marginal differences within the propensity model. Our qualitative study design required intentional selection of both high schools and students to examine variation in coursetaking. The high schools selected for participation in the study were schools where students had participated in a range of curricular tracks in high school (IB, AP/honors, regular, vocational, etc.), and we slightly oversampled students in advanced curricular tracks in order to better understand the experiences students had in advanced coursework.

Data Collection and Analysis:

Description of the methods for collecting and analyzing data.

This study uses administrative data from the Chicago Public Schools, archived by the Consortium on Chicago School Research at the University of Chicago. The current study uses data on students' backgrounds, test scores, and coursetaking patterns, as well as school compositional data. In order to identify whether graduates enroll in college in the fall after graduation, the kinds of colleges they attend, and their two-year persistence rates, we use data from the National Student Clearinghouse (NSC). Currently, NSC's enrollment verification program covers 92 percent of postsecondary enrollment in the United States.

Data was analyzed using the combined propensity score and instrumental variable approach described above. First, we estimate the probability of taking a certain course for students at schools that have high incidences of offering them, conditional on students' subject-specific 11th grade GPAs, ACT scores, interactions between the two, indicators about past course taking, and demographic information. Using the estimated model, we then simulate the propensity for taking these courses among students who attend schools that do not offer these courses, essentially simulating what would have happened if these students had gone to schools that offered AP math and science courses. Finally we create a sample of matched pairs based on these propensity scores to run our outcome models for each college outcome. This analysis was run for each achievement group to avoid heterogeneous comparisons.

In our qualitative study, students were interviewed three times during their senior year and were asked questions about their courses as part of a larger study on the transition to college. Researchers read each case in its entirety and assigned ratings for the level of challenge of a student's senior year overall, as well as for each class for which there was sufficient data to assign an individual qualitative code. See Table 3 for a list of qualitative codes.

Findings / Results:

Description of the main findings with specific details.

Once we control for selection, we find modest effects of senior year course taking on college outcomes. For students with access to somewhat selective colleges (most public colleges in Illinois), we find that taking at least one AP course, or taking a fourth year of math,

improves the likelihood of attending a four year college. For students with access to selective colleges, taking at least two AP courses, in any subjects, improves the likelihood of attending a more selective college. For all groups of students, we find no effects of senior year course taking on college persistence (see Tables 1 and 2 for full results from analysis). Our qualitative investigation found that, with the exception of those in the IB program, students overwhelmingly described senior year as a dismally unchallenging experience: easier than previous years of high school and requiring little work effort. Sub-groups analysis indicated that even students who took rigorous-looking schedules –(AP, math, etc.) were still unlikely to describe senior year as challenging. A further analysis of students’ reports of challenge in individual classes across course types revealed that students did indeed find their AP courses to be challenging. Their senior year schedules, however, were filled with unchallenging elective courses, which dominated their perception of senior year overall.

Conclusions:

Description of conclusions, recommendations, and limitations based on findings.

This study leads to a number of seemingly contradictory findings. First, although there are some courses, like AP, that help students gain access to college, they do not seem to have any effect on persistence. Second, though AP courses stood out as distinctly challenging to students, there is again no evidence of long term positive effects for these classes. Lastly, it is surprising that even students who took challenging advanced courses still typically described senior year as unchallenging. These findings make more sense, however, in the context of a student’s overall academic experience. While advanced courses like AP might be useful tools for the college transition, one or two effective courses is not the same thing as an intentionally designed, day-long, year-long college preparatory experience. The promise and limits of adding individual advanced courses to a student’s senior year schedule presents a complicated story for policymakers who are concerned both with access and attainment in postsecondary education. Would requiring these courses help students in the long term or simply add another barrier to high school graduation? Is expanding access to AP coursework worth the cost? Is it important for college-bound seniors to take a math course? The analysis in this study suggests that the answers to these questions are not straightforward, and that ultimately, students’ postsecondary success will have as much to do with what happens outside of these courses as within them.

Appendices

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Appendix A. References

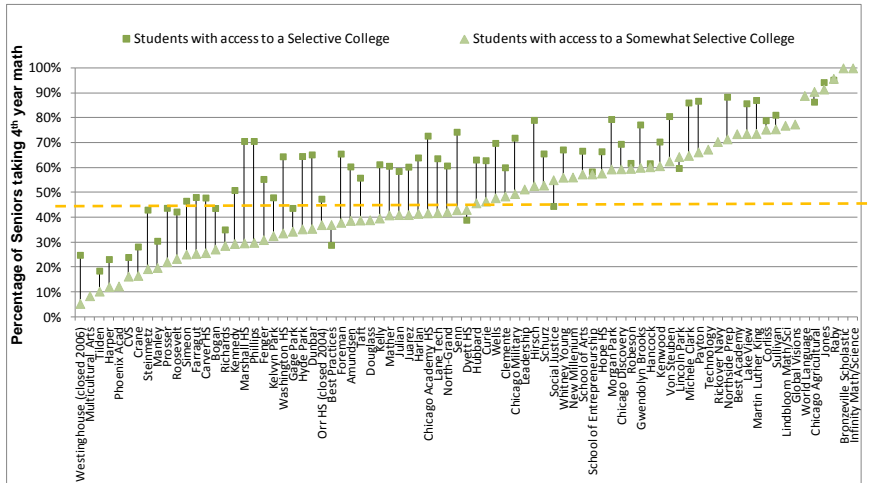
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Appendix B. Tables and Figures

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Figure 1 : Participation in advanced math courses varies widely across high schools, even among similarly qualified students



Note: Numbers in this table come from 2003-2009 CPS graduates who were not enrolled in special education and not in alternative or charter high schools. Data points were only included if school had 15 or more students in a given category.

Table 1: Taking AP courses and a fourth year of math significantly increases the probability that CPS students positioned to enroll in somewhat selective colleges will enroll in a four-year college.

Not addressing selection leads to overestimates of the benefits of coursetaking

		Enrolling in a four year college		Enrolling in selective or very selective among four-year college goers		2 year retention within a four-year college	
		Predicted probability		Predicted probability		Predicted probability	
		No selection controls	With selection control	No selection controls	With selection controls	No selection controls	With selection controls
AP	No AP	42	41.8	14	13.8	61	61.2
	One AP	50.5	50.4	17.8	15.8	65.1	54.0
	Two or more AP	54	51.0	21.1	14.3	77.2	52.7
Effect (difference from no AP)	One AP	8.5**	8.5**	3.8*	Not Sig	5.1**	Not Sig
	2 or more AP	12**	9.1**	7.1**	Not Sig	16.2**	Not Sig
Fourth year math	No math	42	40.5	13	13.1	55	55.4
	Math	46.6	44.7	15.3	16.2	56.7	55.8
Effect of math		4.6*	4.1**	Not Sig	Not Sig	1.7*	Not Sig
Four or more core	< 4 core classes	44	43.7	10	9.7	55	55.1
	4 or more core classes	46.3	44.8	12.3	14.9	28.4	55.8
Effect of 4 core		2.3*	Not sig	Not Sig	5.2**	3.5*	Not Sig

Table 2: Taking two or more AP courses significantly increases the probability that CPS students on pace to selective colleges will enroll in a more selective college.

Not addressing selection leads to overestimates of the benefits of coursetaking

		Enrolling in a four year college		Enrolling in selective or very selective among four year college goers		2 year retention within a four year college	
		Predicted probability		Predicted probability		Predicted probability	
		No selection controls	With selection control	No selection controls	With selection controls	No selection controls	With selection controls
Advanced placement	No AP	67	66.6	33	33.0	70	70.3
	One AP	72.8	71.7	41.2	36.4	73.8	68.3
	Two or more AP	77.5	71.2	53	51.7	77.2	77.2
Effect (difference from no AP)	One AP	5.8**	Not Sig	8.2**	Not Sig	3.8**	Not Sig
	2 or more AP	10.5**	Not Sig	20.0**	18.7**	7.2**	Not Sig
Fourth year math	No math	61	61.1	35	35.5	71	73.5
	Math	67.9	62.0	35.8	38.7	75.1	72.1
Effect of math		7.0**	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig
Four or more core	< 4 core classes	69	68.8	35	35.3	72	71.2
	4 or more core classes	73.8	71.9	38.3	36.9	69	72.3
Effect of 4 core		4.8**	Not Sig	3.3**	Not Sig	Not Sig	Not Sig

Table 3:
Coding for Senior Year Challenge

Question	Responses	Code Considered
Senior Year Overall		
Is senior year harder or easier than previous years of high school?	Easier or the same	Low
	Harder	High
How much homework are you doing this year? Is that more or less than last year?	No homework or virtually no homework; less homework than last year.	Low
	Some homework (approximately weekly); the same as last year	Medium
	Consistent homework (approximately daily); more homework than last year	High
Is your homework difficult or challenging to complete? Is it any harder or easier than last year?	Not challenging; less challenging than last year	Low
	Neither challenging nor easy; the same as last year	Medium
	Challenging; more challenging than last year	High
Are you learning a lot in your classes this year?	No—Not learning anything; learning less than last year	Low
	Yes—Learning college-oriented skills; learning more than last year	High
If I offered you the choice to go back and skip senior year, and you could go straight from junior year to college, would you do it?	Yes—Nothing important learned this year	Low
	No—Learned important things this year	High
Individual Classes Senior Year		
Do you have a lot of homework for this class? How often is homework assigned? How long does it take to complete? How much of it do you do during class time?	No homework or virtually no homework at all; any homework assigned can be finished during the class period	Low
	Some homework (approximately weekly); at least some homework necessary to complete at home	Medium
	Daily homework; projects with clear deadlines; completion of homework required to adequately prepare for class	High
What is that class like? How do you spend your time in that class? What happens on a typical day in that class?	Class is slow moving; class requires little to no participation or attention from student; student is accountable for little of the information imparted in class	Low
	Student is busy at least part of the time in class; information imparted in class is somewhat important (i.e., student takes notes on lectures to use for studying)	Medium
	Student is working productively the entire class period; student is held accountable for information imparted in class	High
Is this class any easier or harder than the classes you've taken in the same subject in previous years?	Easier	Low
	The same	Medium
	Harder	High
Is the work for this class—either during class or work you take home—challenging to complete?	Work is easy or can consistently be done at the last minute; work is the same thing the student did last year; doesn't matter if you miss a day of class	Low
	Work is neither hard nor easy; work is harder but can't describe why; student has to participate in class to some extent	Medium
	Work is hard, and student can describe why; student really has to pay attention in class and/or to the homework in order to understand the concepts; class work or homework requires student to think deeply or in new ways; student believes missing one day of class is risky	High
Are you learning a lot in this class?	No	Low
	Yes	High